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ABSTRACT

The purpose of this research is to tailor the design of information and communications technology (ICT) training material to the needs of Chinese language arts teachers such that the training they receive will be conducive to effective integration of ICT into instruction. Eighteen experienced teachers participated in a Delphi-like survey that comprised a series of four questionnaires. They were asked to describe the professional tasks they routinely performed. Their responses were compiled into a list of 90 task items. Each item was then associated with one or more hardware/software tools that teachers need to learn to perform that task more productively. A restructuring process reduced the total number of items to 67. There will be one training unit developed for each of the 67 items, with each covering certain hardware and software features. Six training units were developed in the tryout phase with the help from five teachers. These units are characterized by their subject-specific contents. (Author)

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Designing ICT Training Material for Chinese Language Arts Teachers

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Abstract: The purpose of this research is to tailor the design of ICT training material to the needs of Chinese language arts teachers such that the training they receive will be conducive to effective integration of ICT into instruction. Eighteen experienced teachers participated in a Delphi-like survey that comprised a series of four questionnaires. They were asked to describe the professional tasks they routinely performed. Their responses were compiled into a list of 90 task items. Each item was then associated with one or more hardware/software tools that teachers need to learn to perform that task more productively. A restructuring process reduced the total number of items to 67. There will be one training unit developed for each of the 67 items, with each covering certain hardware and software features that we specified. We have developed six training units in the tryout phase with the help from five teachers. These units are characterized by their subject-specific contents.

ED 479 569

Introduction

Teacher training in information and communications technologies (ICT) often uses "general-purpose" or "one-size-fits-all" training material for all teachers. The underlying assumption seems to be that all teachers should be able to benefit from the same set of training material regardless of difference in content areas they teach. This probably results from the fact that most training courses often focus predominantly on general skills in common application software rather than on effective integration of ICT into subject teaching. Researchers have pointed out that dipping staff members in training workshops that emphasize provision of ICT skills is not an effective way to get them to use the technologies, much less so to guarantee that they can become innovative integrators of technology into the curriculum (Hannafin, 1999; Hoffman, 1997; Lawson & Comber, 1999).

Different subject areas vary widely in their content knowledge as well as pedagogical methods. It follows that ICT may most likely be used in different ways and for different purposes by teachers of different subjects. Training programs should, therefore, be tailored to teachers' subject-specific needs. Such programs are possible only if training material could be designed based on a detailed analysis of the pedagogical practices of each subject and on a thorough understanding of what teachers really want ICT to help them. The research reported in this paper is a first attempt and an on-going effort to attain this goal. In the remainder of this paper, Section 2 is a description of our multi-round questionnaire survey and the result we got; then, in Section 3, we explain how we mapped the 90 task items to 67 training units. In the end are the conclusions and a sketch of our future work.

The Questionnaire Survey

This research had been conducted using a modified form of the Delphi technique (Cyphert & Gant, 1971; Weaver, 1971). Eighteen Chinese language arts teachers were invited to participate in the questionnaire survey. All of them met the following two criteria that we set for selecting participants: a minimum of 10 years' experience in Chinese language arts teaching and possession of adequate basic skills in common application software (including word processors, presentation software, and Internet tools such as web browsers and email software). They were from nine different secondary schools. Seventeen of them were female and one was male. The typical Delphi procedure of one multi-round questionnaire was modified into a series of four different, though highly coherent, questionnaires in this study. We preserved the essence of the Delphi technique by assembling the responses of each round and reporting them back to the respondents in the subsequent round for elaboration and/or revisions. The four questionnaires were mailed to the participants between August and November 2001.

The first-round questionnaire contained 16 open-ended questions, as shown in (Tab. 1). The first seven questions focused on the five major aspects of Chinese language arts instruction (i.e., reading, writing, Chinese

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calligraphy, oral presentation skills, and additional reading instruction). Respondents were asked to describe about the pedagogical practices of Chinese language arts instruction and the problems they had observed. Then we posed six questions related to how teaching aids had been used in classroom teaching. The remaining three questions concerned other routine duties that Chinese teachers were usually required to perform.

	Question
1	According to the official curriculum guidelines, Chinese language arts instruction in the secondary schools is supposed to cover the following five aspects: reading, writing, Chinese calligraphy, oral presentation skills and additional reading instruction. Please describe what is being taught in each of these aspects and the percentage of total lecture hours allocated to each.
2	Please describe common pedagogical practices of *reading instruction*. What do you think are the major problems of current practices?
3	Please describe common pedagogical practices of *writing instruction*. What do you think are the major problems of current practices?
4	Please describe common pedagogical practices of *Chinese Calligraphy instruction*. What do you think are the major problems of current practices?
5	Please describe common pedagogical practices of *oral presentation skills instruction*. What do you think are the major problems of current practices?
6	Please describe common pedagogical practices of *additional reading instruction*. What do you think are the major problems of current practices?
7	What are major difficulties faced by Chinese language arts teachers with regard to classroom teaching?
8	What are the common teaching aids used by Chinese language arts teachers? How often are they used?
9	How effective is the use of teaching aids in enhancing classroom teaching?
10	What are students' feedback on the use of teaching aids in Chinese language arts instruction?
11	What are the major difficulties faced by Chinese language arts teachers when they try to use teaching aids?
12	What teaching aids do you think that Chinese language arts teachers need most?
13	How do Chinese language arts teachers prepare for classroom instruction? What tools do they use most often with regard to preparatory work?
14	Other than classroom instruction and preparatory work, what are other tasks that Chinese language arts teachers' are required to do on a regular basis?
15	Among the various professional tasks carried out by Chinese language arts teachers on a regular basis, what tasks are thought to be most demanding on teachers' time and effort?
16	What do you think that the computer can do to ease Chinese teachers' teaching job?

Table 1: Questions in the First-Round Questionnaire

We compiled the participants' first-round responses and presented the result in the second round questionnaire for further elaboration and/or revisions. The second-round result was then organized into a list of 90 task items. Among them, 55 items were directly connected to teaching, including preparatory tasks (e.g., gathering information for lesson plans), classroom teaching (e.g., teaching formal letter writing), and after-class tasks (e.g., grading exam papers). The remaining 35 items were mainly administrative (e.g., classroom management) and communicative (e.g., mentoring) tasks. (Tab. 2) shows the first 12 teaching-related items that were grouped under the section of "Preparatory Tasks for Lectures."

1.1	*Preparatory Tasks for Lectures*	*Rating*
1.1.1	Preparing Course Syllabus	❶ ❷ ❸ ❹ ❺
1.1.2	Planning Review Schedule	❶ ❷ ❸ ❹ ❺
1.1.3	Designing Students' Learning Worksheets	❶ ❷ ❸ ❹ ❺
1.1.4	Gathering Textual Material	❶ ❷ ❸ ❹ ❺
1.1.5	Gathering Pictures	❶ ❷ ❸ ❹ ❺
1.1.6	Gathering Audio and Video Material	❶ ❷ ❸ ❹ ❺
1.1.7	Studying the Articles To be Taught	❶ ❷ ❸ ❹ ❺
1.1.8	Surveying Educational CD Titles	❶ ❷ ❸ ❹ ❺
1.1.9	Browsing Related Web Sites	❶ ❷ ❸ ❹ ❺
1.1.10	Looking Up New Characters and Phrases	❶ ❷ ❸ ❹ ❺
1.1.11	Preparing Handouts	❶ ❷ ❸ ❹ ❺
1.1.12	Making Lesson Plans	❶ ❷ ❸ ❹ ❺

Table 2: A Portion of Round 3 Questionnaire

The 90 items were presented to the participants in the third-round questionnaire, asking them to assign a rating of 1.0 (least important) to 5.0 (most important) to each. By this we intended to find out how important teachers

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thought of each task in terms of needing ICT skills to help them accomplish the task. The 18 participants' ratings for each item were averaged to derive the *priority factor* for it.

The items were ranked from the most important to the least important according to their priority factors. The ratings and the rankings were then provided in the fourth round questionnaire to solicit participants' further comments. In particular, we asked them to explain in more detail about several task items and tell us how they thought ICT might assist in those tasks. For example, one of the eight questions asked was: "Task item 1.2.1.6.7—'teaching of rhetorics' and task item 1.2.1.6.8—'teaching of Chinese grammar' received an average ratings of 3.56 and 3.50, ranking 48 and 50 respectively. What are the specifics of these two task items? What do you think that ICT can help in improving teaching and learning in these two respects?"

Among the 90 tasks items that were presented for rating, Table 3 shows the 10 top-ranking items. It is interesting in noting that only three items, the shaded rows in Table 3, are directly related to teaching. In fact, of the 55 directly teaching-related items, only 25 items (45%) ranked in the top half, compared with 20 of 45 (57%) administrative task items. In other words, the respondents seemed to have regarded ICT skills more relevant to administrative and communicative tasks than to teaching tasks. This finding is not surprising, considering that previous studies, such as the ones done by McCannon & Crews (2000) and Clark (2000), have repeatedly shown that more teachers used the computer for administrative tasks than to enhance classroom instruction. However, given that ICT integration in subject teaching was rarely practiced in Taiwan's secondary schools, much less in Chinese language arts instruction, our participants' awareness of the potential benefits of using ICT within the curriculum might have thus been greatly confined. After all, it is much easier to relate administrative and communicative tasks to ICT skills than to relate teaching tasks to ICT skills. For example, a respondent could have readily connected "computing and analyzing students' grades" (ranked No.1 in (Tab. 3)) with common spreadsheet tools or "publishing students directory" (ranked No.6) with word processing tools. In contrast, it would be much harder for them to see what the use of ICT might have to do with "teaching of Chinese grammar." Realizing this general fact, the teacher training providers in Taiwan should try to offer more training programs oriented toward integrating ICT into instruction so that our teachers can become more educated in the theories and practices of ICT integration. This, in turn, calls for more training material designed to serve that purpose.

Rank	Task Item	Average Rating
1	Preparing Exam Papers	4.94
1	Computing and Analyzing Students' Grades	4.94
1	Preparing Grade Reports	4.94
1	Developing and Maintaining Student Web Site	4.94
1	Developing and Maintaining Chinese language arts Teachers' Web Site	4.94
6	Managing Test Bank	4.89
6	Publishing Student Directory	4.89
8	Preparing Presentation for the Meetings	4.83
9	Designing Students' Learning Worksheets	4.67
10	Preparing Meeting Agendas and Minutes	4.61

Table 3: The 10 Top-Ranking Task Items

While we were pursuing the details of professional tasks involved in Chinese language arts instruction throughout the survey, questionnaires 2, 3 and 4 also contained a second section in which questions were posed to elicit responses concerning how ICT could help in some particular aspects of Chinese language arts instruction. The six questions in the second-round questionnaire asked about how the participants thought of the computer as a teaching aid, especially in contrast to the traditional teaching aids they had used before. The third round questionnaire contained five questions asking the participants to assess the potential benefits and possible obstacles of using the Internet in Chinese language arts instruction. We put special emphasis on the Internet because we considered it the most promising technology in revolutionizing the way of teaching and learning. With the fourth round questionnaire, its Section 2 contained two questions that were related to the use of ICT in keeping students' records and preparing grade reports. All these questions succeeded in generating from our respondents many useful ideas that can be used to enrich our training material, as will be mentioned again in the next section.

Mapping Task Items to Training Units

Since our ultimate goal is to design training material for Chinese language arts teachers based on the task items derived from the survey result, we need to map these 90 task items to a suitable number of training units. We

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began by making an assignment of software/hardware tools to each task item. That is, we tried to identify the software/hardware tools that teachers would need to learn to perform that task more efficiently or innovatively. The assignment was based on the task description that our respondents gave in their responses to the questionnaires, as well as what they suggested that ICT might help with the tasks. (Tab. 4) shows the software/hardware assignment for the 12 task items that appeared in (Tab. 2). Taking Item 1.1.6 (i.e., "Gathering Pictures") as an example, we assigned three application tools (i.e., web browser, picture viewer, and image editor) and two hardware tools (i.e., scanner and digital camera) to it. Some of the task items that the teachers found not really necessary for involving the use of ICT, and which we also agreed, were omitted from this assignment. For example, Items 1.1.7 and 1.1.10 (ranking 74 and 83 among the 90 items) were dropped during this assignment process.

Task Item	Software	Hardware
1.1.1 Preparing Course Syllabus	Word Processor (e.g., MS Word)	-
1.1.2 Planning Review Schedule	Word Processor	-
1.1.3 Designing Students' Learning Worksheets	Word Processor	-
1.1.4 Gathering Textual Material	Word Processor Web Browser (e.g., Internet Explorer) Chinese OCR Software	Scanner
1.1.5 Gathering Pictures	Web Browser Picture Viewer (e.g., ACDSee) Image Editor (e.g., PhotoImpact)	Scanner Digital Camera
1.1.6 Gathering Audio and Video Material	Web Browser Multimedia Software (e.g., Windows Media Player) Digital Audio Editor (e.g., GoldWave) Video Editor	Camcorders CD-ROM Drive DVD-ROM Drive
1.1.7 Studying the Articles To be Taught	-	-
1.1.8 Surveying Educational CD Titles	Web Browser	-
1.1.9 Browsing Educational Web Sites	Web Browser	-
1.1.10 Looking Up New Characters and Phrases	-	-
1.1.11 Preparing Handouts	Word Processor	
1.1.12 Making Lesson Plans	Word Processor	

Table 4: Software and Hardware Tools for the 12 Items in Table 2

It is apparent from what is shown in Table 4 that more than one task item would end up being assigned the same or similar set of software/hardware tools. For example, popular application tools such as word processor, presentation software and web browser would be used in many of the tasks. In such cases, we grouped the task items that were similar in nature into a single unit. For example, Items 1.1.1, 1.1.2, and 1.1.12, were merged into one. On the contrary, some task items that were found to be too coarse-grained or that involved the use of too many software/hardware tools were split into two or more items. For example, developing student web site was further divided into eight separate units because of the complexity of ICT skills involved; items 1.1.5 and 1.1.6 also required more than one training unit. The guidelines we used were that each unit should contain the right amount of material for a three-hour training session and that each unit should enable the trainees to produce something practical that they could readily use for instructional or other purposes after attending the training session.

The restructuring yielded a list of 57 training units, among which 39 units were related to integration of ICT into Chinese language arts instruction, and 18 units concerned teachers' administrative and communicative tasks. Integration-related units included such units as "Use of Presentation Tool for Theme-Based Writing Instruction" and "Use of Internet Publishing in Writing Instruction." We then added 10 "Getting Started" units to it to cover the basic computer concepts and skills that teachers need to learn before they proceed to latter units. This resulted in a total of 67 units at the end.

As it is not possible to develop training material for 67 units all at once, we selected six of them for implementation in the tryout phase. With this trial implementation, we had intended to demonstrate what we meant by "subject-specific" training material. Other than covering knowledge and operational skills of certain software/hardware tools that we specified for each unit, each unit had contained learning activities and examples/exercises that were closely connected to Chinese language arts instruction. We borrowed many useful ideas from the participants' responses in the survey while we were creating contents for these units. Furthermore, we engaged five of the 18 participants in the design process to help provide subject-specific contents as well as suggest suitable writing style. (Tab. 5) shows one of the learning activities included in a unit entitled "Locating Instructional Material Using Directories and Search Engines." In this activity learners were guided through the steps of searching for resources about Su Shi, a famous poet of Sung Dynasty in ancient China.

Activity 4: Using a directory to locate resources about Su Shi
Go to: *http://www.yam.com* and click through the following links to narrow your focus:
Step 1: Select "Arts & Humanities" from the directory's broad categories.
Step 2: Select the "Literature" subdirectory.
Step 3: Select the "Chinese Literature" subdirectory.
Step 4: Select the "Classical Chinese Literature" subdirectory.
Step 5: Select the "Poetry & Lyric Songs" subdirectory.
Step 6: Read the short description about each web site and follow the links to desired web sites.

Table 5: A Learning Activity in a Training Unit

Conclusions

In this research we attempted to define the scope of Chinese language arts teachers' ICT needs based on an analysis of the professional tasks they performed routinely. We came up with a list of 90 task items, which were finally mapped to 67 training units. Training material for six of them have been developed in the tryout phase to demonstrate the concept of implementing "subject specific" contents. We have arranged a partnership with a junior high school in Taipei County to field test these six units in a training course offered to 17 Chinese teachers at that school. Feedback collected from this training course will be used to improve our design of other training units in the future.

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